



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,597	03/29/2004	Ravi Prasher	P18285	2876
28062	7590	04/07/2006		EXAMINER
BUCKLEY, MASCHOFF, TALWALKAR LLC 5 ELM STREET NEW CANAAN, CT 06840			NGUYEN, HUNG THANH	
			ART UNIT	PAPER NUMBER
			2841	

DATE MAILED: 04/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

10

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/811,597	PRASHER, RAVI
	<b>Examiner</b>	<b>Art Unit</b>
	HUNG T. NGUYEN	2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 17 October 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-28 is/are pending in the application.  
 4a) Of the above claim(s) 17-22 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-16 and 23-28 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>10/17/05</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____



## DETAILED ACTION

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-16, 23-28 drawn to an apparatus, classified in class 361, subclass 688.
- II. Claims 17-22, drawn to a method, classified in class 29, subclass 800+.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case different type of liquids can be used to cool the system instead of using the de-ionized water.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mathaniel Levin on 3/20/06 a provisional election was made without traverse to prosecute the invention of group I, claims 1-16, 23-28. Affirmation of this election must be made by applicant in replying to this Office action. Claims 17-22 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16, 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina et al. (US 5,239,200) in view of Bhatia (US 6,094,919) and Venkatasubramanian (US 6,722,140).

**Regard claim 1:** Messina et al. discloses in figures 1 and 6, an apparatus comprising: an integrated circuit die (16) having a front surface (surface toward element 12) on which an integrated circuit is formed and a rear surface (opposite of element 12) that is opposite to the front surface (surface toward element 12); a member (20, 100) to define at least one microchannel (portion of 22 and portion of 46) at the rear surface (opposite of element 12) of the die (16), the microchannel (portion of 22 and portion of 46) to allow a coolant to flow therethrough (see column 3, lines 28-41). Messina et al. does not disclose at least one thin film thermoelectric cooling device in the at least one microchannel.

Bhatia discloses in figures 2-4, at least one thin film thermoelectric cooling device (element 35 consisting of channels P, N and represent for thermoelectric) in the at least one microchannel.

Messina et al. and Bhatia are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Bhatia for be benefit of reducing heat.

**Regard claim 2, 13, 24:** Messina et al. discloses all elements of the apparatus as described above with respect to claim 1 except, Messina does not disclose at least one thermoelectric device is formed on the rear surface of the IC die.

Bhatia discloses in figures 2-4, at least one thermoelectric device is formed on the rear surface of the IC die (explain above).

Messina et al. and Bhatia are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Bhatia for be benefit of reducing heat.

**Regard claim 3, 25:** Messina et al. discloses in figures 1 and 6, the member (explain above) has a front side (side attached to IC) which faces the rear surface of the IC die (explain above), said front side (side attached to IC) of the member (explain above) having at least one groove (46) therein to define the at least one microchannel (explain above).

**Regard claim 4:** Messina et al. discloses in figure 1 and 6, the member is an integrated heat spreader (it appears elements 20, 100 can use as heat spreader since it transfer and reduce heat).

**Regard claim 5, 6, 7, 10, 26:** Messina et al. discloses in figure 6, the apparatus wherein the member is formed of copper (see column 3, lines 24-30).

**Regard claim 8, 9, 27:** Messina et al. discloses in figure 6, the coolant includes water (see column 3, lines 28-41).

**Regard claim 11:** Messina et al. discloses in figure 6, the member (explain above) is bonded (It appears member is bonded to IC) to the rear surface of the IC die (explain above).

**Regard claim 12, 14:** Messina et al. discloses in figures 1, the apparatus comprising a heat spreader (20); the member (100) interposed between the heat spreader and the rear surface of the IC die (explain above); the at least one microchannel (22) including: a first tier of microchannels (from back of element 16 to element 46) defined by the rear surface of the IC die (16) and by grooves in the member (100); and a second tier of microchannels (the bottom surface of element 100 toward IC to element 46) defned by a rear surface of the member (100) and grooves (46) in the heat spreader (20), the second tier of microchhnannels being above the first tier of microchannels (it appears second tier is above first tier, see figures).

**Regard claim 15:** Messina et al discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose the integrated circuit formed on the front surface of the IC die is a microprocessor. However, it is old and well known for one ordinary skill in the art to make integrated circuit on the surface of the IC is a microprocessor for the purpose of processing data.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make integrated circuit on surface of IC is a microprocessor for the benefit of processing data.

**Regard claim 16:** Messina et al discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose at least one thermoelectric device includes at least one pair of stacked thermoelectric devices.

Vankatasubramanian discloses in figure 1, at least one thermoelectric device includes at least one pair of stacked thermoelectric devices.

Messina and Vankatasubramanian are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling system of Messina et al. to have stack of thermoelectric device as taught by Vankatasubramanian for be benefit of reducing heat.

**Regard claim 23:** Messina et al. discloses in figures 1 and 6, a system comprising: an integrated circuit die (16) having a front surface (surface toward element 12) on which a microprocessor is formed and a rear surface (opposite of element 12) that is opposite to the front surface (surface toward element 12); a member (100) to define at least one microchannel (portion of 22 and portion of 46) at the rear surface of the die (16), the microchannel (portion of 22 and portion of 46) to allow a coolant to flow therethrough (see column 3, lines 28-41); a chipset (plurality of chips set 16 shown in figure 1) in communication with the microprocessor.

Messina does not disclose at least one thin film thermoelectric cooling device in the at least one microchannel.

Bhatia discloses in figures 2-4, at least one thin film thermoelectric cooling device (element 35 consisting of channels P, N and represent for thermoelectric) in the at least one microchannel.

Messina et al. and Bhatia are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling of Messina et al. to have thin film thermoelectric device as taught by Bhatia for be benefit of reducing heat.

**Regard claim 28:** Messina et al. discloses discloses all elements of the integrated circuit as described above with respect to claim 1 except, Messina et al. does not disclose a drive circuit (17) to supply electrical power to the at least on thermoelectric device.

Vankatasubramanian discloses in figure 1, at least one thermoelectric device includes at least one pair of stacked thermoelectric devices.

Messina and Vankatasubramanian are analogous art because they are from the same field of endeavor to make cooling system.

Therefore, it would have been obvious for one ordinary skill in the art at the time of the invention to make cooling system of Messina et al. to have drive circuit as taught by Venkatasubramanian for be benefit of supply electrical current.

### Relevant Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Hiraishi (US 6,314,741) teaches the cooling system, Johnson et al. (US 6,278,049) teaches the thermoelectric device, Chu et al. (US 2002/0062855) teaches the cooling assembly for electronic, Chu et al. (US 6,804,966) teaches the heat dissipation, Law et al. (US 6,711,904) teaches the heat management, Xie (US 5,880,524) teaches the heat pipe for electronic, Clark (US 4,930,280) teaches the liquid cooling system, Cardella (US 5,918,469) teaches the cooling electronic device, Chu et al. (US 6,424,533) teaches thermoelectric with heat spreader.

### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG T. NGUYEN whose telephone number is 571-272-5983. The examiner can normally be reached on 8:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KAMMIE CUNEO can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

HN

HUNG THANH NGUYEN

3/29/06



KAMMIE CUNEO  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800